

WHAT IS CLAIMED IS:

1. A geometric structure having a plurality of faces disposed on a compound substrate, the compound substrate comprising a machined substrate and a  
5 substantially replicated substrate wherein at least one of the faces is located on the machined substrate and at least one of the faces is located on the replicated substrate.

2. The geometric structure of claim 1, wherein the geometric structure comprises a cube corner element.

3. The geometric structure of claim 1, wherein at least one of the faces comprises a compound face, wherein a portion of the compound face is located on the machined substrate and a portion of the compound face is located on the replicated  
15 substrate.

4. The geometric structure of claim 3, wherein the portion of the compound face on the machined substrate is substantially aligned with the portion on the replicated substrate.

5. The geometric structure of claim 3, wherein the portion of the compound face on the machined substrate and the portion on the replicated substrate have angular orientations that differ by less than 10 degrees of arc.

6. The geometric structure of claim 3, wherein the compound face has a  
25 transition line separating the portion on the machined substrate from the portion on the replicated substrate.

7. The geometric structure of claim 6, wherein the compound face terminates at a nondihedral edge of a cube corner element, and wherein the transition  
30 line is nonparallel to the nondihedral edge.

8. The geometric structure of claim 1, wherein the geometric structure comprises a cube corner element having an outline in plan view selected from the group of shapes consisting of a hexagon and a rectangle.

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9. A mold comprising a plurality of geometric structures set forth in claim

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10. The mold of claim 9, wherein the plurality of geometric structures  
10 comprise a plurality of cube corner elements.

11. The mold of claim 10, wherein at least some of the plurality of cube  
corner elements are PG cube corner elements.

12. The mold of claim 10, wherein the plurality of cube corner elements are  
15 part of a structured surface that comprises cavities formed in the replicated substrate  
and pyramids formed at least in part on the machined substrate.

13. The mold of claim 10, wherein at least some of the cube corner  
20 elements are arranged in opposing orientations.

14. The mold of claim 10, wherein at least some of the cube corner  
elements are canted and form matched pairs of cube corner elements.

15. A retroreflective article made by at least one replication from the mold  
of claim 11.

16. A compound substrate comprising a substantially replicated substrate  
having a structured surface and a discontinuous machined substrate covering only a

portion of the structured surface, the compound substrate also comprising at least one geometric structure having at least one face disposed on the structured surface and at least another face disposed on the machined substrate.

5 17. The substrate of claim 16 wherein the geometric structure comprises a cube corner element having a cube height of no greater than about 1 mm, the at least one face and the at least another face being disposed on opposite sides of a transition line that is nonparallel to a dihedral edge of the cube corner element.

10 18. The substrate of claim 16, wherein the at least one face and the at least another face are disposed on opposite sides of a transition line, wherein substantially all transition lines are parallel to a reference plane.

15 19. The substrate of claim 16, wherein the geometric structure comprises a cube corner element having an outline in plan view selected from the group of shapes consisting of a hexagon and a rectangle.

20 20. A compound substrate comprising a substantially replicated substrate and a machined substrate, the replicated substrate having a structured surface and the machined substrate disposed in discrete pieces on the structured surface.

25 21. The compound substrate of claim 20, wherein the structured surface comprises cavities and the discrete pieces comprise a plurality of pyramids that are adjacent to the cavities.

22. The compound substrate of claim 21, wherein the pyramids and cavities form cube corner elements that have associated therewith a symmetrical entrance angularity.

23. A cube corner article made by at least one replication from the substrate of claim 20.

5 24. A method of making a geometric structure in an article, comprising the steps of:

providing a compound substrate having a structured surface formed along an internal interface between two substrates; and

10 forming grooved side surfaces in an exposed surface of the compound substrate to form a geometric structure, the geometric structure comprising a portion of the internal interface and a portion of the grooved side surfaces.

25. The method of claim 24, wherein the geometric structure comprises one of a cube corner element or a PG cube corner element.

15 26. The method of claim 24, wherein the providing step comprises the steps of:

passivating a surface of at least one of the two substrates; and

selectively removing portions of the passivated surface.

20 27. The method of claim 24, wherein the forming step comprises forming an array of cube corner elements, which array includes the geometric structure.

28. The method of claim 27, wherein at least some of the cube corner elements are canted and arranged in opposing orientations.

25 29. The method of claim 24, further comprising forming at least one reference mark in at least one of the two substrates.

30. The method of claim 24, wherein the grooved side surfaces extend along axes that are parallel to a common plane.

5 31. The method of claim 24, wherein the providing step comprises:  
providing a first substrate;  
forming a plurality of faces in a first surface of the first substrate; and  
forming a second substrate over the plurality of faces as a replica.

10 32. The method of claim 31, wherein the forming a plurality of faces in the first surface comprises forming at least two intersecting sets of parallel v-shaped grooves.

15 33. The method of claim 24, wherein the step of forming grooved side surfaces produces discrete pieces of one of the two substrates on the other substrate, the method further comprising the step of:  
removing at least some of the discrete pieces to expose portions of the internal interface.

20 34. The method of claim 24, further comprising the step of:  
replicating the geometric structure to form retroreflective sheeting.

25 35. The method of claim 24, wherein the step of forming grooved side surfaces comprises the step of forming a plurality of geometric structures selected from the group consisting of three-sided geometric structures and four-sided geometric structures.

36. A method of making a structured surface article comprising a geometric structure having a plurality of faces, the method comprising the steps of:  
forming a plurality of faces in a first surface of a machined substrate;

forming a replicated substrate of the machined substrate to form a compound substrate;

forming a plurality of faces in a second surface of the machined substrate opposite the first surface; and

removing selected portions of the machined substrate to form a geometric structure having at least a first face disposed on the machined substrate and at least a second face disposed on the replicated substrate.

37. The method of claim 36, wherein the geometric structure is one of a plurality of geometric structures each comprising a cube corner element, at least some of the cube corner elements being arranged in opposing orientations.